PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2001-152295**

(43)Date of publication of application : **05.06.2001**

(51)Int.Cl. **C22C 38/00**

C22C 38/40

C22C 38/54

(21)Application number : **11-336869**

(22)Date of filing : **26.11.1999**

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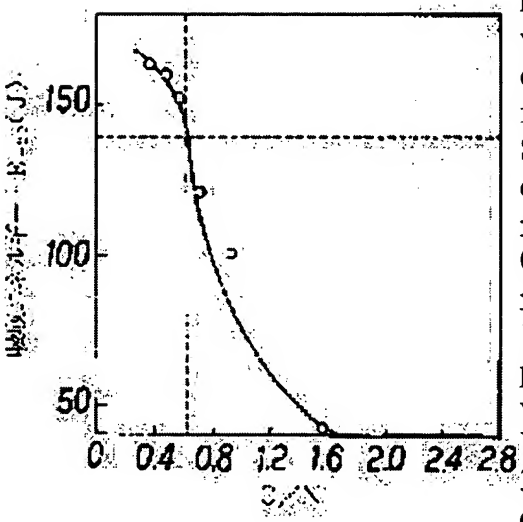
(54) **HOT ROLLED STAINLESS STEEL PLATE FOR CIVIL ENGINEERING AND BUILDING CONSTRUCTION USE, EXCELLENT IN WORKABILITY AND WELDABILITY**



(57)Abstract:
PROBLEM TO BE SOLVED: To provide a hot rolled martensitic stainless steel plate excellent in weldability and workability as well as in corrosion resistance and suitable for use as a steel for civil engineering and building construction.
SOLUTION: The steel plate has a chemical composition containing, by mass, ≤0.012% C and ≤0.02% N under the condition of C+N=0.005 to 0.03% and c/ N< 0.6 and further containing ≤1.0% Si, ≤1.0% Mn, ≤0.08% P, ≤0.01% S, 10-15% Cr and 0.1-0.6% Ni. Moreover, it is preferable that, in the above composition, the value of Y defined by Y=Cr+Mo+1.5Si+0.5Nb+8Al-Ni-0.5 Mn-30C-30N-0.5Cu is regulated to ≤10.7. Further, either or both of Cu and Mo, either or both of Ti and B, and either or both of Nb and V can be incorporated.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]
[Claim 1] By mass %, below C:0.012 % It is N:0.02% or less C+N:0.005 -0.03% and C/N<0.6 Contain under a condition and further Below Si:1.0 % Mn: Below 1.0 %, P:0.08% or less, S:0.01% or less, Cr: 10 to 15% Engineering works and stainless steel hot-rolled steel product for building construction excellent in the processability and weldability which are characterized by having the composition which contains nickel:0.1 - 0.6 % and consists of the remainder Fe and unescapable impurities.
[Claim 2] The engineering works and the stainless steel hot-rolled steel product for building construction according to claim 1 with which said composition is characterized by being satisfied with Y value specified by following the (1) formula of 10.7 or less.
Account Y=Cr+Mo+1.5Si+0.5Nb+8 aluminum-nickel-0.5Mn-30 C-30 N-0.5Cu .... (1)
It is the content (mass %) of Cr, Mo, Si, Nb, aluminum, nickel, Mn and C, N, and Cu: each element here.
[Claim 3] The engineering works and the stainless steel hot-rolled steel product for building construction according to claim 1 or 2 characterized by containing further one sort chosen from among Cu:0.1 - 0.6 % and Mo:0.1 - 0.6 % by mass %, or two sorts in addition to said composition.
[Claim 4] The engineering works and the stainless steel hot-rolled steel product for building construction according to claim 1 to 3 characterized by containing further one sort chosen from Ti:0.005 -0.05% and B:0.0005 to 0.0050% of inside by mass %, or two sorts in addition to said composition.
[Claim 5] The engineering works and the stainless steel hot-rolled steel product for building construction according to claim 1 to 4 characterized by containing further one sort chosen from among Nb:0.01-0.1 %, and V:0.01 - 0.1 % by mass %, or two sorts in addition to said composition.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a stainless steel hot-rolled steel product, especially relates to a stainless steel hot-rolled steel product suitable as engineering works and an object for building construction.
[0002]

[Description of the Prior Art] as engineering works and the charge of building construction material -- the former to SS400 etc. -- ordinary steel and SM490 etc. -- the material which gave paint and plating has mainly been used for high-strength steel and these steel materials. However, use of various material is beginning to be considered with diversification of a design in recent years. Especially, the stainless steel excellent in design nature and corrosion resistance can be called attractive material, if it takes into consideration that the maintenance expense to rusting is almost needlessness from a viewpoint of a life cycle cost (LCC). Also when especially the building built in a seashore zone has problems, like the maintenance expense for that it is a short life and corrosion control increases and promotes waterfront development, development of the stainless steel as engineering works and corrosion-resistant functional materials for building construction is expected very much.

[0003] Stainless steel is SUS 430 from the metal texture. Ferrite system stainless steel represented, SUS 410 The martensite system stainless steel and SUS 304 which are represented The austenitic stainless steel and SUS 329 which are represented 2 ** stainless steel and SUS 630 which are represented It is divided roughly into the precipitation-hardening type stainless steel represented. [former / having inquired as an object for building construction] in such various stainless steel With most use track records including material strength, corrosion resistance, the ease of welding, welding part toughness, and also flexibility it is austenitic stainless steel -- stainless steel standard SAS 601 for building construction **** -- SUS 304 which are austenitic stainless steel, SUS 304N, SUS 316, and SUS 329J1 Four sorts are specified.

[0004] These austenitic stainless steel has the characteristic of fully satisfying the characteristic value required of engineering works and structural material, such as intensity, corrosion resistance, refractoriness, and welding part toughness. however, expensive [boil / austenitic stainless steel is carrying out abundant content of the alloy elements, such as **nickel and Cr, and / markedly / compared with ordinary steel and] -- ** Since producing stress corrosion cracking and ** coefficient of thermal expansion are large compared with ordinary steel and thermal conductivity is still comparatively smaller, It was easy to accumulate distortion resulting from the thermal effect at the time of welding, and there was a problem that the application to general structure material was difficult, and a scope was limited, for it being difficult to apply to the member of which accuracy is required etc.

[0005] Since it is such, by these days, application to the engineering works and structural steel materials of martensite system stainless steel is being considered as substitution of the ordinary steel which gave plating and paint. Martensite system stainless steel has little Cr content as 11 to 13% compared with austenitic stainless steel. and since nickel is not contained, it is markedly alike, and it is inexpensive, and a coefficient of thermal expansion is small, and thermal conductivity is large, and also compared with ordinary steel, it excels in corrosion resistance further, and there is the feature of having power-proof [high]. Moreover, martensite system stainless steel has oxidation resistance with sufficient 800 **. Furthermore, there are also no worries about the stress corrosion cracking under existence of the chloride which there are no worries about sigma embrittlement which poses a problem by high Cr ferrite system stainless steel, and 475 ** embrittlement, and poses a problem with austenitic stainless steel.

[0006] However, SUS 410 [the general-purpose martensite system stainless steel

represented] C content is as high as a 0.08 mass % grade, and welding part toughness and the processability of a welding part are inferior, and when welding, preheating is needed further, it has a fault, like welding operation nature is inferior, and the problem was left behind to application to a member to be welded. As opposed to such a problem, [JP,S51-13463,B] Cr: 10 - 18wt% (mass%) and nickel:0.1 - 3.4 wt% (mass%), Si:1.0 wt% (mass%) -- following and Mn:4.0 wt% (mass%) -- containing the following -- further -- C:0.03wt% (mass%) -- following and N:0.02wt% (mass%) -- [decrease and] below It is made to make a welding thermal effect part generate MASSHIBU martensitic structure, and the martensite system stainless steel for welding structures which raised the performance of the welding part is proposed.

[0007] To JP,S57-28738,B, moreover, Cr:10 - 13.5wt% (mass%), Si:0.5 wt% (mass%) -- containing Mn:1.0 - 3.5 wt% (mass%) hereafter -- further -- C:0.02wt% (mass%) -- following and N:0.02wt% (mass%) -- after decreasing below Furthermore, by under nickel:0.1wt % (mass%) restricting severely, the martensite system stainless steel for structures excellent in the toughness of a welding part which does not need preheating and the after heat before and behind welding, and processability is proposed.

[0008] [with the technology indicated to JP,S51-13463,B and JP,S57-28738,B] compared with the former, the welding part characteristic of martensite system stainless steel is markedly alike, and is improved, and application of the martensite system stainless steel to a member [need / container material etc. / to be welded] came to progress sharply.

[0009]

[Problem to be solved by the invention] [however, the martensite system stainless steel material manufactured with the technology indicated to JP,S51-13463,B and JP,S57-28738,B] It was hard to say that it has sufficient characteristic as compared with the demand characteristic as latest engineering works and charge of building construction material, and the further improvement was desired in respect of economical efficiency in addition to the toughness of a welding part, processability, and corrosion resistance.

[0010] moreover, [JP,H10-53843,A] these days Cr:10 - 13wt% (mass%) and Si:1.0 wt% (mass%) -- hereafter Below Mn:1.0wt % (mass%) contains nickel:0.10 - 1.0wt % (mass%). furthermore, C:0.03wt% (mass%) -- hereafter after reducing remarkably N:0.02 - 0.03wt% (mass%) and C A system and B1 3.0mm of board thickness which was excellent in processability and corrosion resistance by reducing the intervention thing of a system The following stainless steel for civil engineering and construction is indicated. However, the steel indicated to JP,H10-53843,A is developed mainly as an object for secondary members which does not weld, although it is inexpensive steel materials applicable as a structure member for common residences. Therefore, if it hit that welding applied the steel materials manufactured with the technology indicated to JP,H10-53843,A to a required member, there was a problem that weldability needed further to be improved.

[0011] This invention solves the problem in the conventional technology which was described above, and aims at offering the martensite system stainless steel hot-rolled steel product suitable as the engineering works and steel materials for building construction used for the part which makes welding indispensable which was inexpensive, was excellent in corrosion resistance, and was further excellent in weldability and processability.

[0012]
[Means for solving problem] In order to attain the above-mentioned technical problem, first, paying attention to C and N, in the welding part characteristic of martensite system stainless steel, this invention persons dissociated and became the influence of ******C and N independent, and considered it. It has been made desirable for C and N to increase the crack susceptibility of a welding thermal effect part, and to be the element which degrades the ductility and the toughness of a welding thermal effect part, to know having a bad influence on the welding part characteristic, and to decrease as much as possible from the former. However, according to examination of this invention persons, as engineering works and steel materials for building construction After considering it as the quantity (C+N) of the proper range required [a martensitic phase is stable, and] in order to obtain desired hardness moreover rather than both reducing C and N infinite While reducing C as much as possible, the knowledge of the hardness of a welding thermal effect part, toughness, processability, etc. being improved with sufficient balance was carried out by making N remain to some extent and maintaining a C/N ratio in the proper range.
[0013] Based on the above-mentioned knowledge, this invention adds examination further and is completed. Namely, this invention is mass % and [below C:0.012 % / N:0.02% or less] C+N: 0.005 -0.03% and C/N<0.6 It contains under a condition. Furthermore, below Si:1.0 %, below Mn:1.0 %, P:0.08% or less, S:0.01% or less, Cr : 10 to 15%, nickel:0.1 - 0.6 %, Or they are engineering works and the stainless steel hot-rolled steel product for building construction excellent in the processability and weldability which are characterized by having the composition which contains less than aluminum:0.10% further and consists of the remainder Fe and unescapable impurities. Moreover, at this invention, said composition is a next (1) formula.
Y=Cr+Mo+1.5Si+0.5Nb+8 aluminum-nickel-0.5Mn-30C-30N-0.5Cu .... (1)
(-- [a thing / it is desirable that it is satisfied with Y value specified here by Cr, Mo, Si, Nb, aluminum, nickel, Mn and C, N, and content (mass %)) of Cu:each element of 10.7 or less, and / this invention / in addition to said composition / with mass %] further It is desirable to contain one sort chosen from among Cu:0.1 - 0.6 % and Mo:0.1 - 0.6 % or two sorts, and [this invention] In addition to said each composition, by mass % further Ti:0.005 -0.05%, It is desirable to contain one sort chosen from B:0.0005 to 0.0050% of inside or two sorts, and [this invention] It is desirable to contain further one sort chosen from among Nb:0.01-0.1 %, and V:0.01 - 0.1 % by mass % or two sorts in addition to said each composition.
[0014]
[Mode for carrying out the invention] First, the Reason for limitation of the chemical component of the martensite system stainless steel hot-rolled steel product of this invention is explained. Mass % in composition only describes it as % hereafter.
C: Below 0.012 % is N:0.02% or less, and C+N:0.005 -0.03%, although C/N<0.6C and N make the hardness of a martensitic phase increase, they increase the crack susceptibility of a welding thermal effect part, and degrade the ductility and the toughness of a welding thermal effect part. Moreover, it combines with Cr in steel, carbon nitride is formed, Cr ****** is generated, and corrosion resistance is degraded. For this reason, in this invention, N made 0.02% the maximum for 0.012 %, and C limited the sum total (C+N) of C content and N content to 0.03% or less further. Reduction of C and N is effective in

improvement in the welding part characteristic, and an improvement of processability. However, it becomes difficult to consider it as the organization which too much reduction makes increase the load of refinement, and promotes elasticity-ization of a martensitic phase, and has 80% or more of martensitic phase at the rate of area with low welding crack susceptibility, and welding part toughness deteriorates by formation of a still bigger and rougher ferrite grain. For this reason, the minimum of (C+N) was made into 0.005 %. In addition, preferably, C is below 0.008 % and N is 0.01 to 0.015%.

[0015] Moreover, even if the sum total (C+N) of C content and N content is 0.005 to 0.03% of within the limits, the welding part characteristic especially welding part toughness, and the welding ****** characteristic may fall, and at this invention, they are the ratio of C content to N content, and C/N further 0.6 It limits to the following. To drawing 1 = (C+N) the relation between the C/N ratio at the time of presupposing that it is fixed 0.02 to 0.03% and the Charpy impact test absorbed energy value (test temperature: -20 **) of a welding thermal effect part (HAZ 2.0mm) is shown. In addition, the piece of a Charpy impact test chose subsize of 7mm thickness.

[0016] Drawing 1 to C/N is 0.6. Above, it turns out that the absorbed energy of a welding thermal effect part falls rapidly. C/N is 0.6. Above, the ductility-brittleness transition temperature of the Charpy impact test of a welding part becomes the high temperature side, and welding part toughness deteriorates. At this invention since it is such, it is C/N 0.6 It carried out the following.

Si: Although below 1.0 % Si is the effective element which has a **** operation, superfluous content causes the fall of toughness and processability. For this reason, Si was limited to below 1.0 %. In addition, it is 0.03-0.5 % preferably.

[0017] Mn: It is an element which stabilizes the Os Tena Ito **, and is an effective element which controls the grain growth of a welding thermal effect part further, and improves welding part toughness while below 1.0 % Mn has a **** operation. However, superfluous content causes the fall of processability, and a corrosion-resistant fall. For this reason, Mn was limited to below 1.0 %. In addition, it is 0.06 to 0.09% preferably.

[0018] It is desirable to be a harmful element and to decrease as much as possible by this invention to corrosion resistance, while P:0.08%or less P degrades the processability between heat, processability, and toughness. Since the influence would become remarkable if content exceeds 0.08% especially, P was limited to 0.08% or less. S:0.01%or less S combines with Mn, and is MnS. It forms. MnS It becomes the starting point of initial rusting. Moreover, S is a harmful element which carries out a segregation to a crystal grain community, and embrittles ****, and it is desirable to decrease as much as possible in this invention. Since the influence would become remarkable if content exceeds 0.01% especially, S was limited to 0.01% or less. In addition, it is below 0.006 % preferably.

[0019] Cr: 10 to 15%, although Cr is an effective element which raises corrosion resistance, it cannot secure corrosion resistance sufficient in less than 10% of content. Cr is a ferrite phase stabilization element, on the other hand, while the content exceeding 15% reduces processability, the stability of the Os Tena Ito ** falls, it becomes impossible to secure the martensitic phase of the specified quantity at the time of hardening, and intensity falls. For this reason, in this invention, Cr was limited to 10 to 15% of range. In addition, as for Cr, from a viewpoint of coexistence of corrosion resistance and processability, it is desirable to consider it as 11 to 13.5% of range.

[0020] nickel: 0.1 - 0.6 %nickel is an element which raises ductility and toughness, and make it more than 0.1 % contain especially in this invention for the improvement in toughness of a welding thermal effect part. On the other hand, the content exceeding 0.6 % is bent and degrades processability. For this reason, nickel was limited to the range of 0.1 - 0.6 %.
two sorts being one sort chosen from among Cu:0.1 - 0.6 % and Mo:0.1 - 0.6 %, or an element effective in each of Cu(s) and Mo(es) raising corrosion resistance, and accepting necessity -- the inside of Cu and Mo -- one sort -- or two sorts can be contained. Furthermore, Cu which is the Os Tena Ito ** type Narimoto matter controls the grain growth of a welding thermal effect part, and acts effective in an improvement of welding thermal effect part toughness while it raises corrosion resistance. Although such an effect is accepted by the content more than 0.1 %, the content exceeding 0.6 % increases embrittlement of steel materials, especially heat crack susceptibility. Since it is such, as for Cu, it is desirable to consider it as the range of 0.1 - 0.6 %.
[0021] Mo has the operation which raises corrosion resistance. Such an effect is accepted by the content more than 0.1 %. On the other hand, the content exceeding 0.6 % reduces toughness and processability remarkably while reducing the stability of the Os Tena Ito **. For this reason, as for Mo, it is desirable to limit to 0.1 to 0.6% of range. In addition, it is 0.3 - 0.5 % more preferably from the balance of corrosion resistance and processability.
[0022] Ti: Each of Ti and B is one sort chosen from 0.005 to 0.05%, and B:0.0005 to 0.0050% of inside, or an element which acts effective in the improvement in hardenability two sorts, and can contain one sort or two sorts in Ti and B if needed. Ti forms carbon nitride, controls a **** deposit of Cr carbon nitride at the time of welding and heat treatment, and contributes effective in corrosion-resistant improvement while it acts effective in the improvement in hardenability. Such an effect is accepted by the content more than 0.005 %. On the other hand, if contained exceeding 0.05%, it will become the tendency for these effects to fall. For this reason, as for Ti, it is desirable to consider it as 0.005 to 0.05% of range. In addition, it is 0.010 - 0.030 % more preferably.
[0023] Although B acts effective in the improvement in hardenability, effect sufficient in less than 0.0005% of content is not acquired, but on the other hand, the content exceeding 0.0050% makes the hardness of steel materials increase superfluously, and degrades processability and toughness. For this reason, as for B, it is desirable to consider it as 0.0005 to 0.0050% of range. In addition, it is 0.0010 to 0.0030% more preferably.
Nb: One sort or 2 sort Nb chosen from among 0.01-0.1 %, and V:0.01 - 0.1 %, Each V is an element which forms carbon nitride, and has the operation which miniaturizes the Os Tena Ito grain, and raises the processability of steel materials, and can contain one sort or two sorts in Nb and V if needed. These effects are accepted by 0.01% or more of content. However, superfluous content of Nb and V exceeding 0.1 % reduces the toughness and the processability of a welding part. For this reason, as for each of Nb(s) and V, it is desirable to limit to the range of 0.01 - 0.1 %. In addition, as for each of Nb(s) and V, it is more desirable to consider it as 0.03 to 0.07% of range.
[0024] aluminum: 0.10%or less aluminum can act as ******, and can be contained 0.10% or less for reduction of oxygen in steel. The amount of oxides increases and the content exceeding 0.10% degrades processability. In addition, it is 0.02% or less more preferably.

Y<=10.7 Y=Cr+Mo+1.5Si+0.5Nb+8 aluminum-nickel-0.5Mn-30C-30N-0.5Cu .... (1)
(It is the content (mass %) of Cr, Mo, Si, Nb, aluminum, nickel, Mn and C, N, and Cu: each element here)
It is desirable to adjust a chemical component so that in addition to regulation of the above-mentioned chemical component Y value specified at (1) ceremony as regulation of the amount of chemical components may be introduced and Y value may become 10.7 or less in this invention for improvement in welding thermal effect part toughness and the improvement in processability including a welding part. The relation of Y value specified by (1) formula at the time of presupposing that it is fixed with C=0.008 %, and N= 0.016 - 0.018 % and the toughness (absorbed energy in -20 ** of a Charpy impact test: E-20) of a welding thermal effect part is shown in drawing 2 . Drawing 2 shows that the toughness of a welding thermal effect part falls notably, when Y value exceeds 10.7. In addition, in calculating Y value using (1) type, about the element which is not contained, it shall calculate as content 0.
[0025] The remainders other than the chemical component which carried out remainder-F(ing) and the unescapable impurities above are Fe and unescapable impurities. As unescapable impurities, below O:0.010 % is permissible. Below, the suitable manufacture method of the martensite system stainless steel hot-rolled steel product of this invention is explained.
[0026] First, it is suitable to refine it further by the well-known refinement methods, such as ****** gas (the RH method), the VOD method, and the AOD method, to cast it in a continuous casting method or the **** method subsequently to slab etc., and to use it as steel material, after ingoting the molten steel of the above-mentioned composition at usually well-known ingot furnaces, such as a converter or an electric furnace. Subsequently a steel material is heated and is used as a hot-rolled steel product by the hot-rolling process. Although the cooking temperature in particular in a hot-rolling process is not limited, if cooking temperature is too high, big and rough-ization of a crystal grain will be brought about, and toughness and processability will be degraded. For this reason, as for cooking temperature, it is desirable to consider it as 1300 degrees C or less. Moreover, although hot-rolling conditions in particular are not limited at a hot-rolling process that what is necessary is just to be able to consider it as the hot-rolled steel product of desired board thickness, as for the finish temperature of hot-rolling, it is desirable to carry out to more than 700 ** from a viewpoint which secures intensity and toughness. However, when processability, ductility, and the good surface quality of a hot-rolling board are required, it is desirable that the finish temperature of hot-rolling of more than 820 ** shall be 1000 degrees C or less.
[0027] It is desirable after the end of hot-rolling to perform hot-rolling board annealing for elasticity-izing by annealing of a martensitic phase. As for hot-rolling board annealing, it is desirable from a viewpoint of elasticity-izing, a processability improvement, and ductility reservation to be referred to as annealing temperature:650 - 750 ** and retention time:3-15h. In addition, it is desirable after the end of hot-rolling board annealing to make the temperature range of 600 - 700 ** into slow cooling of 50 degrees C/h or less from a point of elasticity-izing.
[0028] In addition, after pickling etc. removes a scale after slow cooling and polish etc. adjusts to desired surface quality further, it is good also as a product board.
[0029]

[Working example] The molten steel of the composition shown in Table 1 was ingoted at secondary converter-refinement processes, and was used as slab by the continuous casting method. It is 2.0mm by finish rolling of seven paths with which the last finish temperature becomes 860 - 960 ** after giving rough rolling of three paths which make the pressing-down rate of last rough rolling 30 to 45% for these slab after re-heating at 1200 degrees C. It was considered as the hot-rolled steel product (steel strip) of thickness. In addition, they are board thickness 1.2, 3.0, and 7.0mm further as an object for a welding examination. The hot-rolled steel product (steel strip) of various board thickness was also produced.

[0030] Hot-rolling board annealing was given to these hot-rolled steel products, pickling was further performed to them, and the tensile test and the impact test were done on them. In addition, hot-rolling board annealing considered even 200 ** as the processing which carries out slow cooling (cooling rate : 10 degrees C/(h)) after 690 **x10h maintenance. Moreover, it is 309 of 1.2mm phi about these various hot-rolled steel products. The welding wire of the type was used, the weld joint was produced, the hardness examination of a welding part, the impact test, and the bending test were carried out, and semi-automatic MIG welding estimated the toughness of a welding part, and processability. In addition, welding conditions made atmosphere gas 20%CO2-80% Ar (flux: 20 l/min), made it voltage:25V, current:240 A, and welding speed:8 mm/s, and were considered as 1 path welding.

[0031] The hardness measurement specimen from these weld joint part, the piece of a subsize Charpy impact test (thickness 7.0x width 10.0 x length 55mm) (only 7mm thickness hot-rolled steel product), JIS Z2204 The based piece of a bending test (1.2mm [Thickness and 7.0mm / Thickness hot-rolled steel product] thickness and 2.0mm thickness and 3.0mm) was extracted. In addition, the piece of an impact test considered it as penetration ******, and was extracted from the cross bond part. Moreover, the bending test was bent and was r= 1.0t in radius.

[0032] These test results are shown in Table 2.

[0033]

[Table 1]

【表1－1】

鋼No	化学成分.（質量%）																		備考
	C	N	Si	Mn	P	S	Cr	Ni	Mo	Cu	Ti	B	Nb	V	Al	O	C+N	C/N	Y値	
1	0.0053	0.0140	0.20	0.83	0.020	0.005	11.90	0.48	0.001	0.05	0.001	－	0.001	0.005	0.010	0.005	0.0195	0.39	10.78	本発明例
2	0.0078	0.0160	0.20	0.83	0.020	0.005	11.60	0.40	0.001	0.05	0.001	－	0.001	0.005	0.010	0.005	0.0238	0.49	10.43	本発明例
3	0.0105	0.0180	0.20	0.83	0.020	0.005	11.70	0.53	0.001	0.05	0.001	－	0.001	0.005	0.010	0.005	0.0285	0.58	10.26	本発明例
4	0.0138	0.0220	0.19	0.79	0.020	0.004	12.10	0.41	0.001	0.05	0.001	－	0.001	0.001	0.010	0.005	0.0358	0.63	10.56	比較例
5	0.0169	0.0300	0.18	0.80	0.020	0.005	13.52	0.10	0.001	0.05	0.001	－	0.001	0.005	0.010	0.006	0.0469	0.56	11.94	比較例
6	0.0016	0.0028	0.20	0.80	0.020	0.005	11.20	0.45	0.001	0.02	0.001	－	0.001	0.004	0.010	0.005	0.0044	0.57	10.59	比較例
7	0.0020	0.0048	0.20	0.79	0.020	0.005	10.50	0.35	0.001	0.05	0.001	－	0.001	0.008	0.009	0.005	0.0068	0.42	9.90	本発明例
8	0.0024	0.0073	0.20	0.80	0.020	0.005	11.50	0.58	0.001	0.02	0.001	－	0.001	0.008	0.010	0.005	0.0097	0.33	10.80	本発明例
9	0.0080	0.0121	0.20	0.80	0.020	0.005	11.70	0.50	0.001	0.05	0.001	－	0.001	0.008	0.010	0.005	0.0201	0.66	10.55	比較例
10	0.0096	0.0105	0.20	0.80	0.020	0.005	11.70	0.50	0.001	0.05	0.001	－	0.001	0.005	0.010	0.005	0.0201	0.91	10.55	比較例
11	0.0125	0.0078	0.18	0.80	0.020	0.005	11.50	0.50	0.001	0.04	0.001	－	0.001	0.005	0.008	0.008	0.0203	1.60	10.31	比較例
12	0.0078	0.0160	0.20	0.83	0.020	0.003	11.60	0.18	0.001	0.05	0.001	－	0.001	0.005	0.010	0.005	0.0238	0.49	10.70	本発明例
13	0.0080	0.0160	0.15	0.83	0.020	0.005	12.50	0.04	0.001	0.05	0.001	－	0.001	0.005	0.010	0.005	0.0240	0.50	11.61	比較例
14	0.0079	0.0160	0.15	0.83	0.020	0.005	15.50	0.58	0.001	0.05	0.002	－	0.002	0.008	0.010	0.001	0.0239	0.49	14.07	比較例
15	0.0076	0.0181	0.20	0.80	0.020	0.005	10.20	0.15	0.001	0.04	0.001	－	0.001	0.008	0.011	0.005	0.0257	0.42	9.26	本発明例
16	0.0078	0.0160	0.20	0.83	0.020	0.003	11.82	0.20	0.001	0.05	0.001	－	0.001	0.008	0.010	0.005	0.0238	0.49	10.95	本発明例

[0034]
[Table 2]

【表1－2】

鋼No	化学成分										
	C	N	Si	Mn	P	S	Cr	Ni	Mo	Cu	Ti
17	0.0078	0.0158	0.19	0.68	0.020	0.003	12.50	0.18	0.001	0.05	0.001
18	0.0068	0.0150	0.20	0.83	0.020	0.005	11.60	0.40	0.001	0.13	0.001
19	0.0074	0.0148	0.20	0.83	0.025	0.004	11.54	0.40	0.001	0.50	0.001
20	0.0088	0.0158	0.20	0.68	0.025	0.004	12.50	0.40	0.001	0.65	0.002
21	0.0068	0.0150	0.19	0.66	0.020	0.005	11.60	0.40	0.130	0.13	0.001
22	0.0068	0.0148	0.19	0.66	0.020	0.005	11.60	0.35	0.340	0.28	0.001
23	0.0106	0.0161	0.25	0.88	0.020	0.005	11.40	0.40	0.630	－	0.001
24	0.0060	0.0152	0.21	0.78	0.002	0.005	10.50	0.30	0.002	0.05	0.010
25	0.0070	0.0139	0.19	0.88	0.002	0.005	10.99	0.51	0.001	0.19	0.060
26	0.0058	0.0152	0.21	0.78	0.002	0.004	10.61	0.34	0.002	0.05	0.020
27	0.0072	0.0152	0.21	0.78	0.002	0.004	11.21	0.55	0.150	0.35	0.020
28	0.0072	0.0151	0.21	0.78	0.002	0.004	11.21	0.55	0.001	0.08	0.020
29	0.0078	0.0160	0.20	0.83	0.020	0.005	11.60	0.40	0.001	0.05	0.001
30	0.0088	0.0190	0.20	0.83	0.020	0.005	11.30	0.55	0.001	0.05	0.001
31	0.0075	0.0160	0.20	0.75	0.020	0.005	11.60	0.40	0.001	0.33	0.001
32	0.0075	0.0160	0.19	0.75	0.019	0.005	11.58	0.39	0.001	0.32	0.020

[0035]
[Table 3]

【表2－1】

鋼板No	鋼No	母材特性				溶接継手部特性					
		引張特性			衝撃靭性	最高硬さ	熱影響部靭性		曲げ特性（180°曲げ		
		降伏強さ MPa	引張強さ MPa	伸び %	遷移温度 vTr. ℃	Hv max	vE-20 J	遷移温度 vTr. ℃	板厚＊2.0mm	板厚＊3.5mm	板厚7.0m
1	1	315	445	33	－100	240	160	-45	○	○	○
2	2	323	460	32	－100	283	157	-45	○	○	○
3	3	331	470	30	－90	292	147	-35	○	○	×
4	4	370	510	28	－70	230	100	-15	×	×	×
5	5	385	535	26	－50	205	81	－5	×	×	×
6	6	305	422	38	－75	198	127	-25	×	×	×
7	7	310	433	36	－85	213	139	-30	○	○	○
8	8	313	445	35	－110	224	187	-55	○	○	○
9	9	345	498	25	－70	261	120	-25	×	×	×
10	10	353	505	23	－50	263	100	-15	×	×	×
11	11	380	570	18	－20	259	41	-20	×	×	×
12	12	328	475	32	－95	275	155	-40	○	○	○
13	13	370	493	20	－30	183	67	－5	×	×	×
14	14	383	563	22	－10	170	32	-25	×	×	×
15	15	323	455	33	－115	283	165	-50	○	○	○

[0036]
[Table 4]
【表2－2】

鋼板No	鋼No	母材特性				溶接継手部特性						備考
		引張特性			衝撃特性	最高硬さ	靭性遷移特性		曲げ特性（180°曲げ）			
		降伏強さ MPa	引張強さ MPa	伸び %	遷移温度 vTr ℃	Hv max	vE-40 J	遷移温度 vTr ℃	板厚＊ 2.0mm	板厚＊ 3.5mm	板厚＊ 7.0mm	
17	17	340	471	32	－95	220	138	－30	○	○	×	本発明例
18	18	334	459	34	－105	254	140	－40	○	○	○	本発明例
19	19	338	471	33	－105	260	139	－40	○	○	○	本発明例
20	20	320	450	29	－80	190	129	－30	○	○	×	本発明例
21	21	333	461	34	－110	259	147	－45	○	○	○	本発明例
22	22	329	441	33	－100	240	140	－40	○	○	○	本発明例
23	23	349	489	27	－80	255	113	－20	×	×	×	比較例
24	24	320	440	34	－110	250	179	－50	○	○	○	本発明例
25	25	342	470	29	－80	240	109	－15	×	×	×	比較例
26	26	321	443	33	－105	248	178	－50	○	○	○	本発明例
27	27	330	451	32	－110	255	172	－50	○	○	○	本発明例
28	28	350	501	27	－70	295	108	－15	×	×	×	比較例
29	29	332	455	33	－95	260	139	－40	○	○	○	本発明例
30	30	351	510	26	－80	241	135	－35	○	○	○	本発明例
31	31	330	460	33	－100	251	159	－45	○	○	○	本発明例
32	32	335	463	34	－100	258	159	－45	○	○	○	本発明例

＊）r=1.0t
○：割れず、×：割れ

[0037] the example of this invention -- the hardness of the intensity of a base material, toughness, and a welding part, and toughness -- it bends and excels in all of processability. On the other hand, the toughness of a welding part or a welding part bent the comparative example which separates from the range of this invention, and either of the processability has deteriorated. Steel plate No.4 in which (C+N) separates from the range of this invention especially, No.5, No.6, or steel plate No.11 from which C separated from the range of this invention Degradation of the processability of a welding part and toughness is remarkable. Moreover, steel plate No.9 in which a C/N ratio separates from the range of this invention although (C+N) is this invention within the limits, No.10, No.11, and No.23 2.0mm The crack has occurred and the bending test of thickness of degradation of toughness and processability is also remarkable. Moreover, steel plate No.1 in which Y value separates from the optimum range of this invention, No.16, No.17, No.20, and No.22 The highest hardness of welding part toughness and a

welding part has deteriorated a little. in addition, 7.0mm ****** a thickness specimen 180 ** bends and comes out and a crack occurs -- 3.5mm and 2.5mm If a crack did not occur in a thickness specimen, it was considered as success.

[0038]

[Effect of the Invention] According to this invention, engineering works and the stainless steel hot-rolled steel product for building construction excellent in weldability and processability can manufacture inexpensive, and does a marked effect so industrially. When the use of a martensite system stainless steel hot-rolled steel product is expanded and a life cycle cost is further taken into consideration by this invention, it is effective in the utility value on the industry of a martensite system stainless steel hot-rolled steel product becoming high.

[Translation done.]